It states that as a first step the City has permitted the Manhattan cable operators to scramble cable channels only if there is no state-of-the-art alternative to prevent theft of service. The City is also requiring the cable companies to report to it every two years on the development of state-of-the-art alternatives.

The Consumer Federation of America (CFA) expresses concern about the impact on consumers of the solutions proposed by the cable and consumer electronics industries. CFA calls attention to the huge current investment in consumer electronic equipment. CFA urges the Commission to preserve the maximum functionality of consumer electronic equipment already in place. CFA is concerned that consumers will be left to either buy new equipment once standards are agreed upon by industry or connect a dizzying array of converter boxes and A/B switches to permit consumers to use the features they have already paid for. CFA states that the Commission should create a single national minimum standard for cable ready equipment in association with minimum national standards for signal theft protection and future electronic equipment and cable system upgrades. CFA submits that, at a minimum, if the Commission should decide to phase in these national standards, it should require cable systems to provide electronic equipment manufacturers and consumers with information to determine if their equipment is indeed compatible with a particular cable system that has not yet conformed to the national standard.

The Home Recording Rights Coalition (HRRC) takes issue with the various alternatives advanced by the cable industry. The HRRC asserts that NCTA asks the Commission to disregard or

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options without having to wait for a technician to visit their homes, and allows cable operators to offer pay-per-view services.

3) The introduction of scrambling and set-top descramblers causes certain adverse consequences for subscribers, and the efforts of the Manhattan cable companies to mitigate the consequences have to date been inadequate. The companies must expand their consumer education and assistance efforts.

4) Greater interindustry cooperation can produce improvements in the area of equipment compatibility; and more extensive participation by the Federal government would encourage the cable and consumer electronics industries to: a) enhance their efforts to establish compatibility standards where possible; 2) exchange pertinent information on research into new technologies; and, 3) assure that the public understands the ramifications of investing in various cable or television related products.

overrule Congressional intent to eliminate converter boxes to the extent possible. It submits that the Commission should require or encourage cable operators to use signal techniques that simultaneously transmit all authorized channels to the subscriber's home in clear signals, whether through direct mandate or, alternatively, through rate incentives and disincentives. The HRRC observes that from a consumer's perspective, there can be no contest between true compatibility and the retrofitted set-top boxes or set-back descramblers offered by the cable industry. The HRRC submits that longer-term compatibility requires standards for channelization, digital transmission and compression.

B. Recommendations of Commenting Parties

NCTA, Time-Warner, InterMedia and other cable industry representatives contend that the types of functionality suggested in Section 17 of the 1992 Cable Act are substantially available already in many subscriber installations, particularly where security is provided through traps, or can be provided at modest additional cost to the subscriber. They state that existing set-top cable equipment generally can be made more compatible with extended features of TV receivers and VCRs through the addition of external devices such as universal remote controls, VCR-plus units, external by-pass switches and use of a second set-top unit. For example, by-pass devices can be used to allow access to any unscrambled channel or any one selected scrambled channel. A by-pass filter device would allow access to any unscrambled channel at the same time as any one scrambled channel. Use of two descramblers will allow simultaneous access to two scrambled signals and will allow PIP features to operate.[63] Use of two descramblers would still render the tuning features of the TV receiver or VCR inoperative, however, so that all channel selection would have to be performed through the two set-top units.[64] In addition, there are models of set-top devices available that include built-in timers, multiple descramblers and internal bypass switches. Scientific-Atlanta indicates that it

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[63] CVI cautions that if cable systems provide a second descrambler at reduced or no cost, a potential theft of service problem exists. In such cases, a subscriber could relocate the second unit to a friend or relative to receive programming without paying for it. CVI notes that this problem can be alleviated if both descramblers are packaged in a single enclosure.

[64] Additional description of options for connecting cable service to improve the functioning of consumer equipment is provided in Appendix E, which presents the NCTA publication "Connecting Cable Systems to Subscriber's TVs and VCRs-Guidelines for the Cable Television Industry," supra.

has recently introduced a new set-top unit that provides decompression of digital signals and also includes dual tuning/descrambling capability and many new enhanced features.

Time-Warner states that the simplest supplementary hardware option for improving compatibility is for subscribers to rent or purchase a decoder by-pass switch/splitter. This switch would route unscrambled signals around the single channel output of the set-top box to enable full operation of the features of TV receivers and VCRs with those signals. The switch would also enable full use of equipment features with any premium services protected by traps. Those signals would be available in the clear with the basic service signals. Scrambled channels would be used by tuning the TV receiver or VCR to the output channel of the set-top box. In this mode, however, the unscrambled channels would not be available for use, so that the subscriber would not be able to watch one channel and record another or use other equipment features requiring more than a single channel from the cable service. Additional equipment, as described below, would be needed to support equipment operations that use two scrambled channels or one scrambled channel and another unscrambled channel simultaneously.

Time-Warner submits that if a subscriber purchases tiers of service in addition to basic and a premium service, it is still possible to achieve substantially all of the consumer equipment functionality envisioned in the 1992 Cable Act at modest cost to the subscriber. It states that recording consecutive programs on different channels can be performed using descramblers that include timers that change channels,[65] and that there are also

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[65] Time-Warner indicates that all current vendors of set-top descramblers have models that include timers that change channels. GI states that many set-top boxes now incorporate a controlled VCR programming function that allows the subscriber to program the unit to change channels automatically at future times. This permits the subscriber to record successive programs, scrambled or unscrambled. GI further states that there are a number of devices available today, such as its CFT-2000, that incorporate an on-screen display that provides a consumer friendly interface similar to that provided by many VCRs. It states that these set-top units can optionally be equipped with a remote controlled RF by-pass switch that allows the subscriber to bypass the unit when viewing non-scrambled channels. In the by-pass mode, a broadband signal including all channels is received at the TV receiver. GI further states that it also offers a "Watch 'n Record" set-top box that incorporates two tuners and two descramblers. This allows the subscriber to watch and record two simultaneous scrambled channels. This device can also be used to support "picture-in-picture" functions.

other products available that perform the same function.[66] Time-Warner states that the ability to view one program while recording another and to use PIP features can also be accommodated with scrambled systems through use of supplementary equipment. Such equipment would consist of either a second descrambler/converter or two descrambler/converters in one box. Time-Warner believes that it is appropriate that the cost for such equipment rest with the subscriber who needs it and that a regulatory requirement that spreads this cost across all subscribers would not be appropriate.

Time-Warner, along with other cable operators, states that it is willing to accept the need to notify subscribers of their choices and how these choices impact the utilization of features on TV sets and VCRs. It further submits that this notification should not only inform subscribers about the current situation, but also of possible future developments that may require the subscriber to make choices at a later date. Time-Warner also states that it would help if the consumer electronics industry included information on these techniques in its sales training programs for retailers. It reasons that making consumers aware of these matters before they make an incompatible electronics equipment choice is far preferable to eliminating choice and diversity by restricting cable service or security techniques.

NCTA, Time-Warner and others submit that to address the short term compatibility problem, the cable industry is willing to commit to making available -- at reasonable cost -- optional set-top devices and equipment that can correct many of the compatibility problems highlighted in the 1992 Cable Act. These devices would allow subscribers to:

- Watch a program on one channel while simultaneously taping a program on another channel (dual set-top converter/descramblers or set-top converter/descramblers with RF bypass feature);
- Tape two consecutive programs that appear on different channels (set-top converter/descramblers with built-in timers or remote controls with built-in timers or VCR-Plus+); and,
- Use advanced television picture generation and other display features (dual set-top converter/descramblers).

The EIA concurs that the compatibility problems caused by set-top boxes can be mitigated, but not completely eliminated,

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[66] These include after-market remote controls that have built-in timers. Also, the "VCR-plus" product, in its original component form, can control both VCRs and cable converters with infrared signals emitted at the proper time to change converter channels and turn on the VCR.

through additional equipment and wiring as suggested by cable industry representatives. It observes, however, that the complicated wiring arrangements associated with such solutions simply underscore the complexity of the problem. It points out that, as described in the NCTA publication on connection of consumer equipment to cable service, there are more than two dozen different wiring arrangements, with converter boxes, splitters, A/B switches, etc., for connecting TV receivers and VCRs to cable service.[67]

NCTA, Time-Warner, CVI, Telecable, TCI and other cable representatives strongly support a plan that would implement the EIA/ANSI 563 Decoder Interface standard as the primary means for resolving compatibility problems that result from set-top boxes used with scrambling systems.[68] They submit that use of component descramblers in conjunction with the Decoder Interface plug would make descrambling transparent to the subscriber. These parties state that the cable industry is also willing to commit to making available set-back descramblers that comply with the EIA/ANSI 563 Decoder Interface requirements to subscribers who purchase TV receivers and VCRs with a decoder interface

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[67] See "Connecting Cable Systems to Subscriber's TVs and VCRs -- Guidelines for the Cable Television Industry," supra.

[68] Rogers Cablesystems of Alaska, Inc. states that it has had first hand experience dealing with multiport type decoders for almost 10 years. Rogers notes that it began a 300 home trial in 1984 with Zenith BaseTAC decoders, forerunners of the ANSI/EIA 563 decoders. At the end of the trial period most subscribers were so satisfied that they insisted on keeping their BaseTac units. In 1990, Rogers began field trials of ANSI/EIA 563 "multiport" decoders. It submits that subscribers clearly preferred the ANSI/EIA 563 decoder interface compatible descramblers over conventional descramblers and that one subscriber claimed that picture quality was improved. Rogers states that other subscribers appreciated the ability to continue using the TV receiver remote control.

TeleCable states that it field tested EIA/ANSI 563 standard equipped receivers and component descramblers with 50 subscribers beginning in 1989, on its Overland Park, KS cable system. It states that most of the subscribers in the test were pleased with the Decoder Interface arrangement and perceived it to be transparent. Those subscribers who did not perceive the Decoder Interface to be a complete solution to their compatibility problems indicated that they would have been more satisfied had their VCRs also been equipped with Decoder Interface descramblers. TeleCable states that its cost to install a component descrambler and educate a subscriber about the use of the device ranged from $15 to $20.

connector.[69] To make this plan work, they indicate that it would also be necessary to require consumer equipment manufacturers to include Decoder Interface plugs in all models of their cable ready TV receivers and VCRs. NCTA further states that, on its part, it is willing to work with the CAG to develop backwards compatible standards with more universal applicability.

Parties supporting the Decoder Interface approach submit that use of a component descrambler allows the descrambling function to be located "downstream" of the TV's or VCR's tuner and remote control circuitry, thereby making descrambling transparent. They emphasize that with a Decoder Interface and component descrambler, no set-top device is needed and all of the functions of the consumer equipment are maintained. They further point out that the Decoder Interface descrambler avoids the need for duplication of the consumer device's tuner, remote control and channel indicator. In addition, they state that it does not necessitate converting or remodulating the signal so that it is compatible with the host units tuner and is cheaper than set-top boxes. They state that the Decoder Interface also resolves VCR compatibility problems. They point out that use of a Decoder Interface and plug-in descrambler permits the VCR's timer to regain control of the tuning function, so that sequential recording of different channels becomes possible again. It further observes that if the Decoder Interface feature is only used on TV receivers, the TV receiver would have to be left powered in order to provide descrambled signals to the VCR. Thus, if the VCR is Decoder Interface equipped, sequential programs on different channels can be recorded from cable with no more complication than using the VCR with an antenna.

Parties supporting this approach state that the Decoder Interface solution to operation of the small picture inside large picture PIP is to equip both the TV and VCR with Decoder Interface connectors and plug-in descramblers. They note that this solves two problems: it allows PIP operation and recording of one scrambled program while watching another scrambled channel. They state that in the case of the second type of PIP with multiple pictures, a single Decoder Interface implementation allowing the TV receiver to control its own tuner would enable operation of this feature.

Time-Warner states that the Commission should also consider requiring that the Decoder Interface standard be updated to include priority upgrades as they are developed. These include:

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[69] Scientific-Atlanta states that it will commit to supplying EIA/ANSI 563 component descramblers for use with suitably equipped consumer equipment if the Commission mandates the EIA/ANSI 563 Decoder Interface as part of cable ready equipment.

- Make the remote control signal pass through the decoder non-optional.
- Enabling the descrambler to force-tune the TV set or VCR's channel selector to the appropriate channel to facilitate functions such as NVOD, emergency alert or pre-ordered IPPV programs.
- The addition of an intermediate frequency (IF) output from TV receivers and VCRs to accommodate scrambling systems that operate directly on the carrier of the signal.

Time-Warner states that despite the potential of the Decoder Interface to resolve compatibility problems, there will always be a need for set-top devices. This is because the pace of technological progress in the cable and consumer electronics industries differ as indicated above. Time-Warner states that older equipment, which is typically used in other rooms in the house, will still need set-top cable units. Thus, there is no synchronism between the two processes, and it is not likely that the Decoder Interface will ever be able to completely replace the set-top descrambler.

The EIA and other consumer electronics parties express several concerns about the possibility of using a Decoder Interface standard as a solution to the equipment compatibility problem. First, they state that as a matter of history, the EIA/ANSI 563 standard developed several years ago by the cable and consumer electronics industry failed because of lack of support from the cable industry. Second, any Decoder Interface, whether the original EIA/ANSI 563 standard or some updated version adds to the cost of the price of a TV receiver or VCR, regardless of whether or not the consumer intends to connect that product to cable service. Finally, the EIA states that the EIA/ANSI 563 standard is no longer compatible with the full panoply of scrambling systems used by cable systems today and provides no basis for handling future digital signals.

Thomson Consumer Electronics, Inc. (Thomson) submits that the current EIA/ANSI 563 standard suffers from several shortcomings: there is no provision for two-way interactivity; the standard does not achieve the desired level of cross-brand compatibility; it has not been tested with sync suppression greater than 6 dB; it does not comply with recent FCC standards that require ± 2 dB video response for cable signals; phase modulation or line inversion techniques are not supported, etc. Thomson observes that the EIA/ANSI 563 standard does not address the problems of consecutive channel recording and dual tuner picture in picture unless all equipment incorporates interface connectors. Thomson estimates that the inclusion of a single interface connector would increase the direct manufacturing costs of a piece of equipment from $4 to $6. The resulting cost to the consumer is estimated to be of the order of $18.

Zenith proposes the following as necessary elements of a long term solution to be promulgated by the Commission:

- A new cable ready specification for TV receivers and VCRs that would incorporate an intermediate frequency (IF) interface port with related performance improvements and a microprocessor communication link between the set-back box and the consumer equipment.
- A requirement that consumer electronics manufacturers design to the cable ready specification at least one remotely controlled model in each color TV screen size they market for the screen sizes 25-inch and over.
- A requirement that cable operators make the appropriate interface decoders available to buyers of cable ready products, and offer those subscribers a reduction in their monthly rate.

Zenith believes that its proposed requirement to build cable ready sets should apply to larger receivers because those units are most likely to be the primary viewing set in a household, are most likely to be connected to cable and are most likely to have the advanced features that gave rise to the concerns addressed in Section 17 of the 1992 Cable Act. It estimates that the equipment improvements it recommends would cost manufacturers $14-18 per set, and would lead to retail price increases of $30-40. Zenith submits that TV manufacturers, through the EIA, estimate the full implementation of the Decoder Interface connector and DPU improvements to be in the $60-$70 range. Because of these price considerations, Zenith opposes any initiative that would require all consumer equipment to meet cable ready standards.

Many parties representing cable interests state that the Commission's rules should specify technical standards for TV receivers and VCRs that bear the label "cable ready."[70]

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[70] Time-Warner points to the recent introduction of VCR-Plus technology as an example of how otherwise compatible technology can, absent federal standards, be implemented in a manner that is incompatible with cable service. Time-Warner observes that the original VCR-plus device is a component unit that looks like a remote control. It has a built-in timer and clock and can be programmed to emit infrared signals for both a VCR and any attached cable converter. This allows the user to sequentially record programs on different channels regardless of whether the VCR is connected directly to the cable system. Time-Warner notes that most brands of VCRs now include VCR-plus technology built-in as an extended feature. It further observes, however, that the VCR-plus feature being built-in to VCRs, with few exceptions, is not capable of emitting the codes necessary to change the channels of a cable set-top unit to which the VCR may

Parties representing the cable industry submit that improvements need to be made in the tuners of consumer electronics equipment to make this equipment robust enough to handle cable signals yet still sensitive enough to handle broadcast signals. Cable industry parties also seek improvements in other areas of consumer equipment features and performance. The EIA, Matsushita, Mitsubishi, Zenith and other consumer equipment manufacturers generally concur that certain minimum performance capabilities should be expected of TV receivers and VCRs marketed as cable-ready. These representatives of the consumer equipment industry recognize the value of improving the resistance to interference, tuning performance and tuning range of TV receivers and VCRs to enable them to be compatible with cable service.[71] Time-Warner submits that where the subscriber decides to obtain a new TV receiver or VCR, the new purchase is an opportunity to make significant progress toward compatibility.

Cable industry representatives submit that in addressing specific standards for cable ready consumer equipment, the Commission should consider that the cable environment differs from the over-the-air broadcast environment in several important ways. These differences include:[72]

- Cable input signals can vary from 0 dBmV to +20 dBmV.
- The variation in cable signal levels can be as great as 13 db in a 550 MHz system and even more in 750 and 1000 MHz systems.
- The cable channelization plan includes adjacent channels whose levels can vary by up to 3 dB and whose aural subcarriers can vary from 10 to 17 dB below associated visual carriers.
- Cable channel boundaries can follow one of three schemes (standard, IRC or HRC)
- The cable aural intercarrier frequency tolerance is +/- 5 kHz.

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be connected. Time-Warner states that an excellent concept that is compatible in principle with cable has been installed in a consumer product in a manner that does not work with cable.

[71] The EIA also states that Interim Standard IS-6 is being promulgated as a full ANSI/EIA standard for the channelization of TV receivers and VCRs. The Joint Engineering Committee of EIA and NCTA is revising this standard to incorporate a higher frequency range, consistent with cable capabilities, and is pursuing standardization of receiver immunity to direct pick-up interference and various tuner performance criteria.

[72] See 47 C.F.R. §76.605(a), technical standards on signal quality for cable systems.

NCTA, Time-Warner and others believe that a TV receiver or VCR should not be considered cable ready unless the set-top box can be eliminated. Time-Warner submits that if a product is truly cable ready, it must be able to be connected directly to a cable system and meet these criteria:

- Neither interfere with the reception of signals of other services, nor be susceptible to ingress of unwanted signals;
- Provide all the services the subscriber has paid for without the need of additional hardware installed between the output of the descrambler or decompressor supplied by the cable system and the product;
- Comply with all the FCC rules and standards concerning cable radiation and cable technical standards; and,
- Implement special features in a manner that those features remain substantially usable when the product is connected to cable service.

In addition to the Decoder Interface connector, the following is a summary of some of the specific technical characteristics cable industry parties believe should be standardized for a product marketed as cable ready to fulfill the above criteria. The parties representing consumer electronics manufacturers generally agree with those suggestions relating to tuner performance. In many cases specific parameter values have not yet been identified for elements that would be standardized:

- Tuner range: The participating parties generally believe that a TV or VCR should be able to tune all of the channels offered by a cable service. The consensus of these parties is also that consumer equipment should be able to conveniently tune channels in accordance with the EIA/ANSI IS-6 plan. NCTA states that it does not recommend that the Commission adopt rules regulating the number and frequency of cable channels that must be tunable by a TV receiver or VCR. Rather, it urges the Commission to adopt rules requiring a cable ready product to specify the number of cable channels it is capable of adequately tuning on a clearly visible label attached to the front of the product. Time-Warner similarly recommends that the Commission specify a standard method for specifying the channel capacity of consumer products and cable systems and that consumer products be required to carry a label indicating their channel capability. This would allow consumers to be sure they are choosing equipment that will match their cable service.
- Tuner quality: The TV receiver or VCR tuner should be of sufficient quality to function with all of the channels carried on the cable system available simultaneously at the unit's input terminals without introducing

distortions or noticeable noise. The improved performance should be in the areas of overload, image response, adjacent channel rejection, and noise figure and feedback handling. NCTA states that these improvements would eliminate current deficiencies that are now compensated for by cable converters.

- Improved shielding: NCTA and Time-Warner state that the internal circuits of cable ready TV receivers and VCRs must be adequately shielded to protect against both signal leakage and direct pick-up interference. The shielding requirement should apply to all cables, switches, splitters and any other devices supplied with TV sets and VCRs, and any other devices meant to be connected to cable, such as equipment for receiving cable audio services.
- Improved signal splitters/signal loss in cascaded equipment: If a TV or VCR employs signal splitters, they must be of sufficient bandwidth to split the entire spectrum and to split the signal evenly. Cable representatives state that in the ideal case, a wideband, low-noise amplifier would be provided to maintain signal strength at all of the splitter's outputs. InterMedia observes that cable operators are required to deliver a minimum level of 0 dBmV to the first unit of consumer equipment. If that unit is a VCR, it typically will contain an internal splitter with one side feeding its internal tuner and the other feeding a bypass switch to deliver signal to the TV set when the power is turned off. The total loss of that configuration is important in assuring that the receiver can achieve a reasonable noise-free picture.
- Improved switch isolation: Source selection switches must have adequate isolation over the entire frequency band to prevent cable signals from leaking to other devices such as roof top antennas. InterMedia recommends that antenna input selector switches be required to provide at least 80 dB of isolation between the input ports over the frequency range 54-216 MHz and 60 dB between there and 1000 MHz.
- Off-air antenna access: Antenna connectors must continue to be available on all TV receivers and VCRs because of the possibility that cable systems may not carry all local broadcast signals. In the "antenna" mode, the tuner would tune broadcast channels. In the "cable" mode, the tuner would tune HRC, IRC or standard cable channels. Selection of cable tuning mode could be performed manually or automatically. The antenna side of this switch could also be used to provide access to competitive multichannel video programming distributors, such as video dialtone, DBS, a second cable system or MMDS.

- Two-way IR remote control pass-through/forced tuning capability: NCTA and Time-Warner state that if the cable system uses two-way cable technology by which the subscribers order IPPV programming, the Decoder Interface feature should permit the pass-through of remote control signals to the descrambler module. In addition, an ability to accommodate "force-tuning" should be included if services such as NVOD are to be made available. Where force-tuning capabilities are provided, the component descrambler would send remote control signals to the TV receiver or VCR's tuner that order the tuner to change channels at a pre-determined time.

NCTA and Time-Warner argue that products that do not comply with the Commission's requirements for cable ready should not be able to tune cable channels, only broadcast channels. They also contend that in defining these terms, the Commission should consider the potential for evasion by those who would use other euphemisms to imply that equipment is "cable friendly."

Many parties also observe that digital compression technology is rapidly being developed. Signal compression will permit perhaps as many as ten or more video programs to be carried in the same 6 MHz bandwidth now used for a single analog television channel.[73] GI points out that the digital platform will also support a host of "pipeline" services. It will be possible to include data services that supplement the video programming. CVI states that it and other multiple system operators (MSOs) have committed to purchase compression units beginning in 1994. CVI expects that as many as 10 to 15 percent of its subscribers will have compression technology in their homes soon thereafter.

Continental points out that set-top "decompression" will be needed to allow digital signals to be viewed on receivers that do not have built-in decompression capability. It also observes that while there may be a dominant compression scheme, such as MPEG-2, future innovation will lead to the development of a variety of compression technologies and software. Thus, a variety of hardware capabilities, either individual boxes or component units, will be needed.

NESDA, the Oregon Consumer League and Sony submit that the Commission should prescribe national standards for digital cable service to ensure compatibility with the next generation of

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[73] GI states that its digital systems employ a high speed data signal in each affected channel. A 30 Mbps data signal carrying 27 Mbps of information is transmitted in a 6 MHz television channel. The 27 Mbps is then allocated among the services being transported.

digital technology that will include high definition television and digital signal compression. NESDA states that the transition to digital technology provides a unique opportunity to devise national standards for scrambling and security that will allow cable subscribers to plug in and use consumer products. It further recommends that the Commission adopt a national standard for renewable security, where the key function of the security function is contained in a replaceable module, disc or "smart card." NESDA states that this will allow cable operators to implement system-specific security codes and at the same time allow consumer electronics manufacturers to incorporate the electronics necessary for cable access.

NCTA and Time-Warner submit that the Commission should defer acting on compatibility issues concerning advanced technologies, such as digital video compression, until more is known about them.[74] Cable industry representatives further observe that parties developing services that will compete with cable, such as direct broadcast satellite service (DBS) and video dial tone services, are discussing the use of digital approaches. NCTA and Time-Warner state that it will do the consumer little good if the methods used by cable and other digital video media are not all compatible to the same degree. The CAG, the EIA and Matsushita agree that if multiple standards are allowed to exist, it may not be possible to achieve a cost effective, consumer friendly environment. Ameritech and BellSouth suggest that the Commission establish appropriate digital video compatibility standards through trade associations.

American Telephone & Telegraph Company (AT&T) states that delaying the deployment of digital technologies until standards are established is not warranted. It submits that the cable industry is now on notice that compatibility with consumer equipment will be required and that either voluntary or Commission-issued interface standards are likely. It further observes that if firms choose to deploy digital technologies before those standards are finalized, they will assume the risk that their systems may be subject to modification. AT&T believes that industry experimentation with alternative digital technologies and interfaces while a standard evolves may well provide useful input to the standard-setting effort.

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[74] These parties further point out that the compression method used for digital television is only one element of the total digital transmission system. Other components include: 1) a modulation technique, 2) an addressability and conditional access method, 3) demultiplexing means to separate the signals compressed into each 6 MHz channel, 4) time domain training signals and, 5) error detection and correction schemes.

C. Recommendations of the Cable-Consumer Electronics Advisory Group

In its supplementary comments, the CAG states that there are several measures that can be taken now to increase the cable compatibility of consumer electronic products -- including the many millions of products which have already been sold. The CAG recommends the following short-term measures:[75]

- Cable operators can sell or rent by-pass circuitry that delivers all unscrambled signals directly to the TV or VCR, thereby allowing subscribers to access unscrambled signals in the same manner as if there was a direct connection to the antenna. This would facilitate use of advanced picture generation and display features and allow subscribers to watch one channel while recording another, except in cases involving two scrambled channels, which is infrequently necessary. These devices may also be sold to subscribers at retail. According to CAG, set-top devices incorporating this design exist now and could be deployed within approximately one year from the adoption of rules. It notes that as all set-top devices are remote controllable, the by-pass circuitry is remotely controllable as well.
- Converter/descramblers with built-in timers could be deployed to facilitate sequential recording of different channels. CAG claims that these too, could be deployed within as little as 12 months. It notes that "universal" remote controls with built-in timers have been available at retail for some time.
- For subscribers with subscriptions to two or more scrambled channels who wish to watch one scrambled channel while recording another scrambled channel or to use certain advanced display features with two scrambled channels, a second converter/descrambler -- or a single unit with two converter/descramblers -- could be provided. CAG estimates that the availability of dual descrambler converters is likely to take approximately one year from the adoption of rules.
- The cable industry can strengthen its consumer education programs regarding compatibility options and procedures. Subscribers can be more fully informed about the options they have and how to exercise them. Assistance can be provided concerning the use of supplementary hardware, thereby ensuring that subscribers understand how to reap maximum benefits from their cable subscriptions and from the features of their consumer electronics products.

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[75] The measures suggested by the CAB are very similar to those suggested by Time-Warner, Continental, CVI and others, as indicated above.

To provide more fundamental relief from compatibility problems and reduce consumer confusion, the CAG recommends the following measures be taken:

- First, the term "cable-ready" needs to be defined in a way that fulfills customer expectations. Aspects of the definition must reflect:
  -- "Front-end" receiver design characteristics which accommodate differences between the broadcast and cable environments; in particular, direct pick-up problems need to be avoided (engineers from both industries are working on proposals for specifications); and,
  -- The increasing channel capacity of cable systems. The CAG believes that better inter-industry dialogue concerning channel capacity and channel mapping will be essential so that a TV set or VCR that is cable-ready at the time it is sold remains cable ready (without the need for a set-top converter) for some reasonable period of time in the future.
- Second, the consumer"cable-ready" device must include a Decoder Interface connector. The CAG has identified the Decoder Interface as a means of harmonizing the statutory goals of compatibility and signal security. A Decoder Interface on the back of TV's and VCR's will allow appropriate signals to exit and enter the TV or VCR for external descrambling or decryption. It also conveys other signals which are necessary for supporting cable services other subscribers enjoy through the use of a set-top box. The goal of the Decoder Interface is simply to allow access to all cable services without requiring a set-top box which is connected between the cable system and the TV or VCR. Additional advantages of the Decoder Interface include:
  -- Reduction in the duplication of circuits between the subscriber-owned hardware and that supplied by the cable operator;
  -- Increased video and audio quality due to a reduction in redundant processing of the signal which tends to introduce additional noise and distortion;
  -- Increased reliability;
  -- Facilitating a smooth transition towards digital television services and standards; and,
  -- Reduction in consumption of energy.

  Given the time frame necessary for product changes in consumer products and the fast-moving digital developments in cable, the CAG believes the Decoder Interface specifications must include provisions for processing of digital signals. It states that engineers from the Advisory Group will devise proposed specifications for a hybrid analog/digital Decoder Interface in the near future.

- To ensure the viability of cable-ready products as a means of curtailing compatibility problems, the Commission should:
  - -- Require that all cable companies provide the first decoder in each home for connection to Decoder Interface-equipped TV receivers's and VCR's at no installation charge (in contrast to the installation charge that would ordinarily apply upon installation of a converter/descrambler);
  - -- Require that cable operators charge consumers monthly rentals for set-back decoders and set-top converter/descramblers in proportion to their costs;
  - -- Require cable operators to provide signals in a form compatible with the Decoder Interface and,
  - -- Preclude consumer electronics manufacturers and retailers from using the term cable-ready in connection with any product that does not comply with the front-end design specifications and incorporate the Decoder Interface or its functional equivalent.[76]

The CAG believes it is feasible and desirable for the industries to develop -- and the Commission to then prescribe -- standards for the digital environment per the following timetable:

1993: Define cable-ready
1994: Define transmission and tuner specifications
No later than 1995: Set target dates for standards for decompression and a standard security interface system.

The CAG states that once digital transmission standards and other aspects of the "cable-ready" specification are completed, product design cycles (normally two years) should permit the availability of cable-ready, decoder-interface equipped TV's and VCR's according to each manufacturer's market demand. By that time, the cable industry could be ready to provide decoders to any subscriber who wants them, with the installation fee waivers and monthly price differentials necessary to create an incentive for consumers to find this option attractive. The CAG submits that it will form a subcommittee on digital television to pursue standards in that area, and will draw largely upon the research and efforts of other standards-setting activities related to this area, such as the Motion Pictures Experts Group (MPEG) and the United States Grand Alliance on Advanced Television.

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[76] The CAG also maintains that no regulations are needed regarding the compatibility characteristics of TV's and VCR's that are not marketed as cable-ready.

The New Jersey Office of Cable Television believes the CAG proposals represent a well-developed framework for short-term and long-term solutions to the consumer electronics and cable compatibility issue. However, it maintains that the Commission should prohibit scrambling by operators of the basic tier until such time as the cable operator is able to demonstrate that compatibility with consumer electronic devices within its system will not be adversely affected. GI supports the CAG proposals, stating that these measures will meet consumer needs while continuing to allow the cable industry to innovate.

The Consumer Federation of America (CFA) argues that CAG's proposals are inadequate. It maintains that the CAG's measures constitute no effort to solve the current compatibility problems for the existing 200 million TV sets and 100 million VCR's. According to CFA, the existing situation will only be made worse by the required addition of still more devices (i.e., bypass switches). The CFA is also concerned the CAG's measures effectively will result in consumers renting equipment from cable systems for another 15 years. It believes the Commission should eliminate incentives for cable operators to make system changes that lead to more widespread use of converter boxes. It objects to any continuation of the "monopoly status" of cable-company provided equipment, i.e., descramblers, whether set-top or component. MCSI and Tandy also believe CAG's proposals are inadequate and raise points similar to those of the CFA.

The CFA states that, contrary to the CAG's assertions, basic tiers of service that have been unscrambled will now become scrambled. The CFA urges the Commission not to permit cable operators to require use of in-home de-scrambling equipment for any basic and expanded basic services that were sent in the clear as of the date of passage of the 1992 Cable Act. CFA further states that the Commission should establish a procedure for considering waivers of the requirement that cable systems not require use of descrambling equipment for reception of the above services. CFA's suggested procedure would allow for public comment and would require cable operators to demonstrate that a significant security threat that did not exist prior to passage of the 1992 Cable Act now exists or that a new service offered as part of a regulated tier should not be offered in the clear.

Videomaker Magazine, Inc. (Videomaker) contends that the CAG's long-term proposals do not go far enough. Videomaker urges the Commission to also direct the Advisory Group to study the need for standards in program directory and retrieval systems and to report its findings to the FCC. According to Videomaker, the lack of a comprehensive directory makes it impossible for the consumer to know even the titles of all the programs scheduled to be broadcast.

Parties representing non-cable video provider interests, such as the Ameritech Operating Companies, BellSouth Telecommunications, and Pacific Telesis Group, argue that there is a need for media and information technology interests other than cable to participate in development of future interface standards. Prodigy Services Company advises that it hopes in the future to be able to distribute its information and interactive services over cable television facilities both to personal computers and television sets. Prodigy also supports development of interface standards that permit innovation and competition in equipment design and marketing.

X. Recommendations

As part of the requirements of Section 17 of the 1992 Cable Act, the Congress requested that the Commission report on means of assuring compatibility between cable systems and consumer electronics equipment and to issue regulations for ensuring compatibility within 180 days of this report. The following recommendations will form the basis of the Commission's proposals for regulations in this area.[77]

Consistent with the provisions of the 1992 Cable Act, the Commission's primary goal in this matter is to ensure that consumers are able to enjoy the benefits of both cable programming and the features and functions of their TV receivers and VCRs. The Commission believes the most appropriate course of action is to provide immediate relief for the existing base of consumer equipment; to require more substantial measures by both the cable and consumer electronics industries towards achieving significant compatibility in the near future; and finally to encourage the development of consumer equipment and cable technologies that are fully compatible in the long term.

There is a large base of existing equipment, on the part of both consumers and cable systems, that does not lend itself to ready modifications for improving compatibility. To provide immediate improvement in compatibility, we propose to:

1) Prohibit the scrambling of signals on the basic tier of cable service. This prohibition will ensure that consumers that have purchased TV receivers and VCRs that are capable of tuning basic service channels are able to continue to receive service on those channels without the need for a set-top device. We note that most basic services currently are carried unscrambled.

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[77] The Commission intends to issue a Notice of Proposed Rule Making on these matters shortly.

2) Require cable systems to provide a consumer education program to their subscribers. Such a program would include the notifications required under Section 17 and other educational information on the compatibility of their systems with consumer equipment.
3) Require cable systems to provide subscribers, upon request, with the option of having all unscrambled signals passed directly to their TV receiver or VCR, without passing through the set-top device. Cable systems would be required to provide this capability only upon the request of individual subscribers. This capability could be provided through use of by-pass switches.
4) Require cable systems, upon request of individual subscribers, to provide supplementary equipment such as set-top devices with multiple descramblers and/or timers and similar equipment necessary to enable the operation of extended features and functions of consumer equipment.
5) Require cable operators that offer subscribers the option of renting a remote control unit to:
   - Notify subscribers that they may also purchase a commercially available remote control device; and,
   - Specify the types of remote control units that are compatible with its equipment.
   - Permit the operation of their set-top devices with such commercially available remote control units, or otherwise take no action that would prevent the use of such remote control units. Cable operators would, however, be permitted to disable the remote control functions of a subscriber's set-top in cases where the subscriber so requests.

The Commission believes that the above measures will offer consumers a significant improvement in the use of their existing TV receivers and VCRs with cable service. It recognizes, however, that given the limitations of existing consumer equipment and the current design of cable systems, these measures do not provide a full solution to the current compatibility problems between cable systems and consumer equipment. More significant compatibility improvements are only possible with the introduction of new consumer electronics and cable equipment. Therefore, a regulatory approach for achieving full resolution of these problems will need to focus on new consumer equipment and new/rebuilt cable systems. To begin the process of achieving full compatibility, we propose to:

1) Require cable systems built or re-built after a specified date to use the EIA/ANSI IS-6 channel plan and require all cable systems to use this channel plan after 10 years. Cable systems would not have to activate channels for all of the channels specified in IS-6, but rather would be required to adhere to the frequency plan in this

standard for the channels that they provide to their subscribers. We note that IS-6 now accommodates full 1 GHz cable operation. Further expansion of the IS-6 channel plan would be permitted if needed.

2) Adopt new standards for all consumer electronics equipment that is marketed as "cable ready" or with other marketing terms intended to imply that the equipment is meant for connection to cable service. These standards shall include:
   - a Decoder Interface connector that allows appropriate signals to enter and exit the TV or VCR for external descrambling or decryption of analog or digital cable signals;
   - the ability to tune all of the channels specified in the EIA/ANSI IS-6 standard; and
   - improved tuner performance and shielding.
3) Require cable systems to provide service in a form that is compatible with the Decoder Interface and the component equipment used with that connector.
4) Require cable system operators to provide component descramblers and/or any additional equipment that may be needed to process compressed video service through the Decoder Interface connector. All such equipment shall be provided by the cable system without separate charge for the equipment or its installation.

The Commission notes that the CAG has recommended that all cable systems be required to provide the first decoder in each home for connection to Decoder Interface-equipped TV receivers's and VCR's at no installation charge (in contrast to the installation charge that would ordinarily apply upon installation of a set-top device). The Commission encourages the cable industry to implement this aspect of the CAG plan. The Commission further notes, however, that the component descrambler or decoder is not intended for sale to subscribers and that the functions of these devices are primarily related to cable system security and operations. We therefore are proposing to consider that such equipment is part of the cable plant and shall be provided by the cable system operator to the subscriber without a separate charge for the equipment or its installation. The Commission believes that this approach will encourage the sale and use of cable compatible consumer equipment that includes the Decoder Interface.

The Commission believes that the ultimate goal of this process should be to foster the delivery of cable signals to consumer equipment in the manner that is the most convenient for subscribers. To this end, the Commission continues to encourage the use and development of cable delivery methods such as traps, interdiction, addressable filters and other clear channel delivery systems that eliminate the need for any additional equipment in the subscriber's premises. As required by Section

17, we will continue to monitor such developments and reevaluate our compatibility requirements as the situation may change.

The Commission also encourages the continued efforts of industry groups, such as the CAG, to develop standards for digital compression, digital transmission and a standard security interface system. Such standards would, of course, need to accommodate the terrestrial broadcast digital HDTV standard now under development by the Commission's Advisory Committee on Advanced Television Service.

APPENDIX A: NOTICE OF INQUIRY

FCC 93-30

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Implementation of Section 17	)	
of the Cable Television	)	ET Docket No. 93-7
Consumer Protection and	)	
Competition Act of 1992	)	
	)	
Compatibility Between	)	
Cable Systems and Consumer	)	
Electronics Equipment	)	

NOTICE OF INQUIRY

Adopted: January 14, 1993 ; Released: January 29, 1993

Comments Due: March 22, 1993
Reply Comments Due: April 21, 1993

By the Commission:

INTRODUCTION

1. By this inquiry, the Commission seeks to obtain information regarding means of assuring compatibility between consumer electronics equipment and cable systems. This action is the first step towards our implementation of Section 17 of the Cable Television Consumer Protection and Competition Act of 1992 (1992 Cable Act).[1] The objective of this portion of the 1992 Cable Act is to ensure that cable subscribers will be able to enjoy the full benefits and functions of their television receivers and video cassette recorders (VCRs) when receiving programming from cable systems, consistent with the need to prevent theft of cable service. The information obtained through this inquiry will form the basis for a report to Congress and subsequent rule making to develop appropriate regulations to implement the provisions of Section 17.

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[1] See Cable Television Consumer Protection and Competition Act of 1992, Pub. L. No. 102-385, 106 Stat. 1460, (1992), §17. This proceeding is limited to issues involved in implementation of Section 17 of the 1992 Cable Act. We are addressing the implementation of other portions of this new legislation in separate proceedings.

BACKGROUND

2. Section 17 of the 1992 Cable Act adds a new Section 624A to the Communications Act that addresses compatibility between consumer electronics equipment and cable systems.[2] In Section 624A(a), Congress makes the following findings with regard to this issue:[3]

- Television receivers and video cassette recorders often contain premium features and functions that are disabled or inhibited because of cable scrambling, encoding, or encryption and by the use of cable devices, such as converters and remote control units, needed to receive programming;

- Consumers will be less likely to purchase, and electronics manufacturers will be less likely to develop, manufacture, or offer for sale, television receivers and video cassette recorders with new and innovative features and functions, if these problems are allowed to persist; and,

- Cable operators should use technologies that will prevent signal thefts while permitting consumers to benefit from the features and functions contained in such television receivers and video cassette recorders.

3. Section 624A(b) specifies that, within one year of the enactment of the legislation, the Commission, in consultation with representatives of the cable and consumer electronics industries, must report to Congress on means of assuring compatibility between TV sets, VCRs and cable systems, consistent with the need to prevent theft of cable service.[4] This section also provides that within 180 days of that report, the Commission must issue such regulations as are necessary to ensure compatibility between consumer electronics equipment and cable systems. Section 624A(b) further states that in issuing these rules, the Commission shall consider whether and under what circumstances to permit cable systems to use scrambling, except that the Commission shall not limit the use of scrambling

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[2] See Section 624A, Section 17 of the 1992 Cable Act, supra.

[3] See Section 624A(a), Section 17 of the 1992 Cable Act, supra.

[4] See Section 624A(b)(1), Section 17 of the 1992 Cable Act, supra.

technology where it does not interfere with the functions of subscribers' TV receivers or VCRs.[5]

4. Section 624A(c) specifies that, in developing the rules required by Section 624A(b), the Commission is to consider:[6]

- The costs and benefits to consumers of imposing compatibility requirements on cable operators and TV manufacturers in a manner that, while providing effective protection against theft or unauthorized reception of cable service, will minimize interference with or nullification of the special functions of subscribers' television receivers or VCRs, including functions that permit the subscriber to--
  -- watch a program on one channel while simultaneously using a VCR to tape a program on another channel;
  -- use a VCR to tape two consecutive programs that appear on different channels; and,
  -- use advanced television picture generation and display features, and;
- The need for cable operators to protect the integrity of the signals transmitted by the cable operator against theft or to protect such signals against unauthorized reception.

5. Section 624A(c) further provides that the equipment compatibility regulations prescribed under Section 624A shall include:[7]

- Technical requirements with which a television receiver or VCR must comply in order to be sold as "cable compatible" or "cable ready";
- Requirements that cable operators offering channels whose reception requires a converter unit--
  -- notify subscribers that they may not be able to use the special features of their TV receivers and VCRs;
  -- to the extent technically and economically feasible, offer subscribers the option of having all other channels delivered directly to the subscribers' TV receivers or VCRs without passing through the converter unit;

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[5] See Section 624A(b)(2), Section 17 of the 1992 Cable Act, supra.

[6] See Section 624A(c)(1), Section 17 of the 1992 Cable Act, supra.

[7] See Section 624A(c)(2), Section 17 of the 1992 Cable Act, supra.